

Thrombolysis

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Thrombolysis is the breakdown (*lysis*) of blood clots^[1] by pharmacological means. It is colloquially referred to as *clot busting* for this reason. It works by stimulating fibrinolysis by plasmin through infusion of analogs of tissue plasminogen activator (tPA), the protein that normally activates plasmin.

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Agents

Thrombolysis suggests the use of thrombolytic drugs, which are either derived from *Streptomyces* species, or, more recently, using recombinant biotechnology whereby tPA is manufactured by bacteria, resulting in a recombinant tissue plasminogen activator or rtPA.

Some commonly used thrombolytics are

- streptokinase
- urokinase
- Recombinant tissue plasminogen activators
 - alteplase (rtPA)
 - reteplase
 - tenecteplase

Principles

Formation of blood clots lies at the basis of a number of serious diseases (see below). By breaking down the clot, the disease process can be arrested, or the complications reduced. While other anticoagulants (such as heparin) decrease the "growth" of a clot, thrombolytic agents actively *reduce* the size of the clot.

Most thrombolytic agents work by activating the enzyme plasminogen, which clears the cross-linked fibrin mesh (the backbone of a clot). This makes the clot soluble and subject to further proteolysis by other enzymes, and restores blood flow over occluded blood vessels.

Uses

Diseases where thrombolysis is used:

- Myocardial infarction
- Stroke (ischemic stroke)^[2]
- Massive pulmonary embolism
- Acute limb ischaemia

Apart from streptokinase, all thrombolytic drugs are administered together with heparin (unfractionated or low molecular weight heparin), usually for 24–48 hours.

Thrombolysis is usually intravenous. It may also be used during an angiogram (intra-arterial thrombolysis), e.g. when patients present with stroke beyond three hours.

In some settings such as the United States of America, emergency medical technicians may administer thrombolytics for heart attacks in prehospital settings, by on-line medical direction. In countries with more extensive and independent qualifications, prehospital thrombolysis (fibrinolysis) may be initiated by the emergency care practitioner. Emergency Care Practitioners exist, in among other countries, in South Africa, United Kingdom, and New Zealand. Prehospital thrombolysis is always the result of a risk benefit calculation of the heart attack, thrombolysis risks, and PPCI availability. As such, the prehospital practitioner will often consult with the receiving cardiologist as to treatment decisions— many cardiologists have personal preferences to available treatment options.

Contraindications

There are absolute and relative contraindications to thrombolytic therapy.

Absolute

Previous intracranial bleeding at any time, stroke in less than a year, active bleeding, uncontrolled high blood pressure (>180 systolic or >100 diastolic).

Streptokinase is contraindicated in patients who have been previously treated with streptokinase, as there is a risk of anaphylaxis, a life-threatening allergic reaction, due to the production of antibodies against the enzyme.^[*citation needed*]

Relative

Current anticoagulant use, invasive or surgical procedure in the last 2 weeks, prolonged cardiopulmonary resuscitation (CPR) defined as more than 10 minutes, known bleeding diathesis, pregnancy, hemorrhagic or diabetic retinopathies, active peptic ulcer, controlled severe hypertension.^[*citation needed*]

References

- [^] *thrombolysis* at Dorland's Medical Dictionary
- [^] Wardlaw JM, Zoppo G, Yamaguchi T, Berge E (2003). "Thrombolysis for acute ischaemic stroke". *Cochrane database of systematic reviews (Online)* (3): CD000213. doi:10.1002/14651858.CD000213. PMID 12917889.

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